

Chapter 1

Introduction

1.1 The Need for Aviation System Capacity Improvement

In 1994¹, 23 airports each exceeded 20,000 hours of annual flight delays. With an average aircraft operating cost of about \$1,600² per hour of delay, this means that each of these 23 airports incurred at least \$32 million dollars in annual delay costs. By 2004, the number of airports that will exceed 20,000 hours of annual delay is projected to grow from 23 to 29, unless capacity improvements are made.³ The purpose of this plan is to identify and facilitate actions that can be taken to prevent the projected growth in delays. These actions include:

- Airport Development.
- New Air Traffic Control Procedures.
- Airspace Development.
- New Technology.

For four consecutive years, the number of flights exceeding 15 minutes of delay has declined. After a decrease of just over 24 percent from 1990 to 1991, flights exceeding 15 minutes of delay decreased 6 percent in 1992, 2 percent in 1993, and 10 percent in 1994. The forecast for 29 airports exceeding 20,000 hours of annual delay in 2004 is eleven less than the 40 airports predicted four years ago for the year 2000. These and other delay statistics reflect four years of declining or almost static aviation activity.

Prior to 1994, U.S. economic growth had averaged only 1.9 percent annually during the 1990s. This included a three quarter recession in 1990/1991, which slowed economic growth

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1. 1994 data is used throughout this plan due to the fact that, at publication time, 1995 data was not verified and available.
 2. The actual average aircraft operating cost is \$1,587 per hour. The cost for heavy aircraft 300,000 lbs. or more is \$4,575 per hour of delay, large aircraft under 300,000 lbs. and small jets, \$1,607 per hour, and single-engine and twin-engine aircraft under 12,500 lbs., \$42 and \$124 per hour respectively. These figures are based on 1987 dollars, the latest data available.
 3. For a listing of airports exceeding 20,000 hours of annual delay, see Table 1-4 and Figure 1-5.
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to only 0.8 percent over the 2-year period. The recession was followed by a very weak recovery (1.7 percent growth in 1992), whose slow pace was generally recognized as unprecedented in postwar U.S. history. However, the U.S. economy has now grown for 14 consecutive quarters, with real growth averaging 3.2 percent in 1993 and 3.7 percent in 1994.

This stronger economic activity had a major impact on the demand for aviation services. U.S. commercial air carrier passenger enplanements, which had averaged only 1.5 percent annual growth during the preceding 4 years, were up 8.2 percent in 1994, the largest growth since 1987. Air carrier revenue passenger miles were up 5.5 percent in 1994, the strongest growth since 1986.

Over the next twelve years, the economy is expected to sustain a moderate rate of growth averaging 2.5 percent.⁴ Gross Domestic Product (GDP) is a significant indicator of business activity, which, in turn, drives aviation activity. Figure 1-1 illustrates the historical growth in GDP and commercial air carrier domestic passenger enplanements since 1989 and the anticipated growth through 2006.

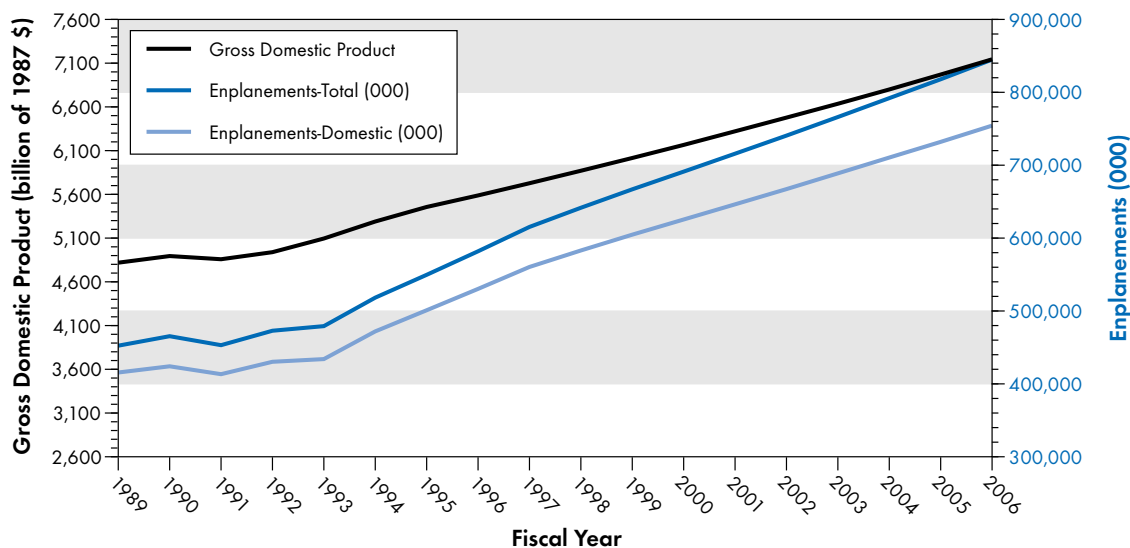


Figure 1-1. Growth in Gross Domestic Product and Domestic Passenger Enplanements, 1989 to 2006

4. *FAA Aviation Forecasts, Fiscal Years 1995-2006*, FAA-APO-95-1, March 1995. The economic projections used in developing the FAA Baseline Aviation Forecasts for the period 1995 to 2000 was provided by the Executive Office of the President, Office of Management and Budget (OMB). For the period 2001 to 2006, the economic scenario uses consensus growth rates of the economic variables prepared by DRI/McGraw-Hill, Inc., Evans Economics, Incl., and the WEFA Group.

According to FAA aviation forecasts, air carrier domestic passenger enplanements are expected to increase at an average annual rate of 4.0 percent between 1995 and 2006, and domestic air carrier aircraft operations are forecast to increase at an average annual rate of 1.9 percent during the same twelve-year period. The higher growth predicted for passenger enplanements relative to aircraft activity is the result of significantly higher load factors, larger seating capacity for air carrier aircraft, and longer passenger trip lengths. International air carrier passenger enplanements are forecast to increase at an annual rate of 5.8 percent, and regional/commuter airline passenger enplanements are expected to grow 6.6 percent annually.

Although the current delay forecasts continue to project serious delays in the absence of capacity improvements, the message contained in succeeding chapters is positive. For example, a great deal is being done to improve capacity and reduce delays through new construction projects at airports and recent enhancements in Air Traffic Control (ATC) procedures. Airspace capacity design projects are being undertaken to study the terminal airspace associated with delay-impacted airports across the country. In addition, there are many emerging technologies in the areas of surveillance, communications, and navigation that will further improve the efficiency of new and existing runways and of terminal and en route airspace.

In fact, these capacity-producing improvements are frequently interrelated; changes in one often require changes in the others before all the potential capacity benefits can be realized. Resolving the problem of delay requires an integrated approach that develops capacity improvements throughout the aviation system, while at the same time maintaining or improving the current level of aviation safety. Improvements in capacity — constructing new runways and taxiways, installing enhanced facilities and equipment, applying new technologies — generally require long lead times. We must start preparing now for improvements that take 5 to 10 years to plan, develop, and implement.

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1.2 Aviation Capacity Enhancement Plan

The Aviation Capacity Enhancement Plan is an important part of Federal Aviation Administration (FAA) and Department of Transportation (DOT) efforts to improve the Nation's transportation system. The Secretary of Transportation's National Transportation Policy (NTP) describes the enormity of the Nation's transportation infrastructure needs and sets as a major theme the need to maintain and expand the national transportation system. The Federal Aviation Administration Strategic Plan, based on the NTP, provides the goals and objectives towards which the FAA is working. The FAA Operational Concept supports the broad policies and strategies of the Strategic Plan by creating a concept of operations. The concept of operations is the basis for developing the NAS architecture. The architecture provides the structure for specific actions and projects in the numerous operating-level plans which affect the NAS. The FAA Operational Concept delineates the operational capabilities that must be in place to achieve an operating vision of the future in 2010. The NAS architecture represents the road map to 2010. The Air Traffic Service Plan takes a close-in look and provides a description of services between now and 2000. The NAS architecture links the Operational Concept, the Air Traffic Service Plan, and input from the user community, including the operational concepts of free flight, and adds the necessary structure to make capital investment decisions. The Aviation Capacity Enhancement Plan describes capacity and delay reduction measures necessary to support growth in the National Airspace System.

The Aviation Capacity Enhancement Plan is also linked to other FAA operating-level plans. In particular, it addresses requirements for research, for facilities and equipment, and for airport improvements that can be funded from the FAA's Airport Improvement Program (AIP). Each of these areas is addressed in a major FAA plan. The Research, Engineering, and Development (RE&D) Plan is used to determine which systems and technologies the FAA should use to accomplish agency goals and objectives. The RE&D Plan includes the research needed to validate the new instrument approach procedures detailed in Chapter 3. The Capital Investment Plan (CIP) provides a framework for investment in the facilities and equipment needed to improve the National Airspace System (NAS). The CIP funds the technological improvements described in Chapter 5. The National Plan of Integrated Airport Systems (NPIAS) presents airport improvement projects nationwide that are eligible for AIP funding. Among these are projects to build new airports and to improve existing airports to in-

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crease capacity and safety. These projects are discussed in Chapter 2.

The Aviation Capacity Enhancement Plan identifies the causes of delay and quantifies its magnitude. The plan catalogues and summarizes programs that have the potential to enhance capacity and reduce delay. Within the plan, these programs have been organized into broadly related categories that, in turn, parallel chapter development: Airport Development, New Instrument Approach Procedures, Airspace Development, and Technology for Capacity Improvement.

1.3 Level of Aviation Activity

1.3.1 Activity Statistics at the Top 100 Airports

The top 100 airports in the United States, as measured by 1994 passenger enplanements, are shown in Figure 1-2.⁵ These 100 airports accounted for over 94 percent of the 555.3 million passengers that enplaned nationally in 1994.

In 2010, 995 million domestic and international passengers are forecast to enplane at these airports.⁶ This represents a projected growth in enplanements of nearly 79 percent over the 16 year period of the forecast, an average annual rate of growth of more than 7 percent.

In 1994, over 26 million aircraft operations occurred at the top 100 airports. By 2010, operations are forecast to grow to approximately 34 million at these airports, a projected growth in operations of nearly 30 percent.

Operations data for 1992, 1993, and 1994 and enplanement data for 1992, 1993 and 1994, as well as forecasts of operations and enplanements for 2010 for the top 100 airports, are included in Appendix A.

5. The top 100 airports were chosen based on 1994 passenger enplanements as listed in the FAA's annual report, *Terminal Area Forecasts*.

6. Based on data in the FAA's *Terminal Area Forecasts*, FY92, FY93, and FY94 operations and enplanement data for the top 100 airports, a forecast for the year 2010, and the percentage growth that the forecast represents are shown in Appendix A, as well as a ranking by percentage growth in operations and enplanements.

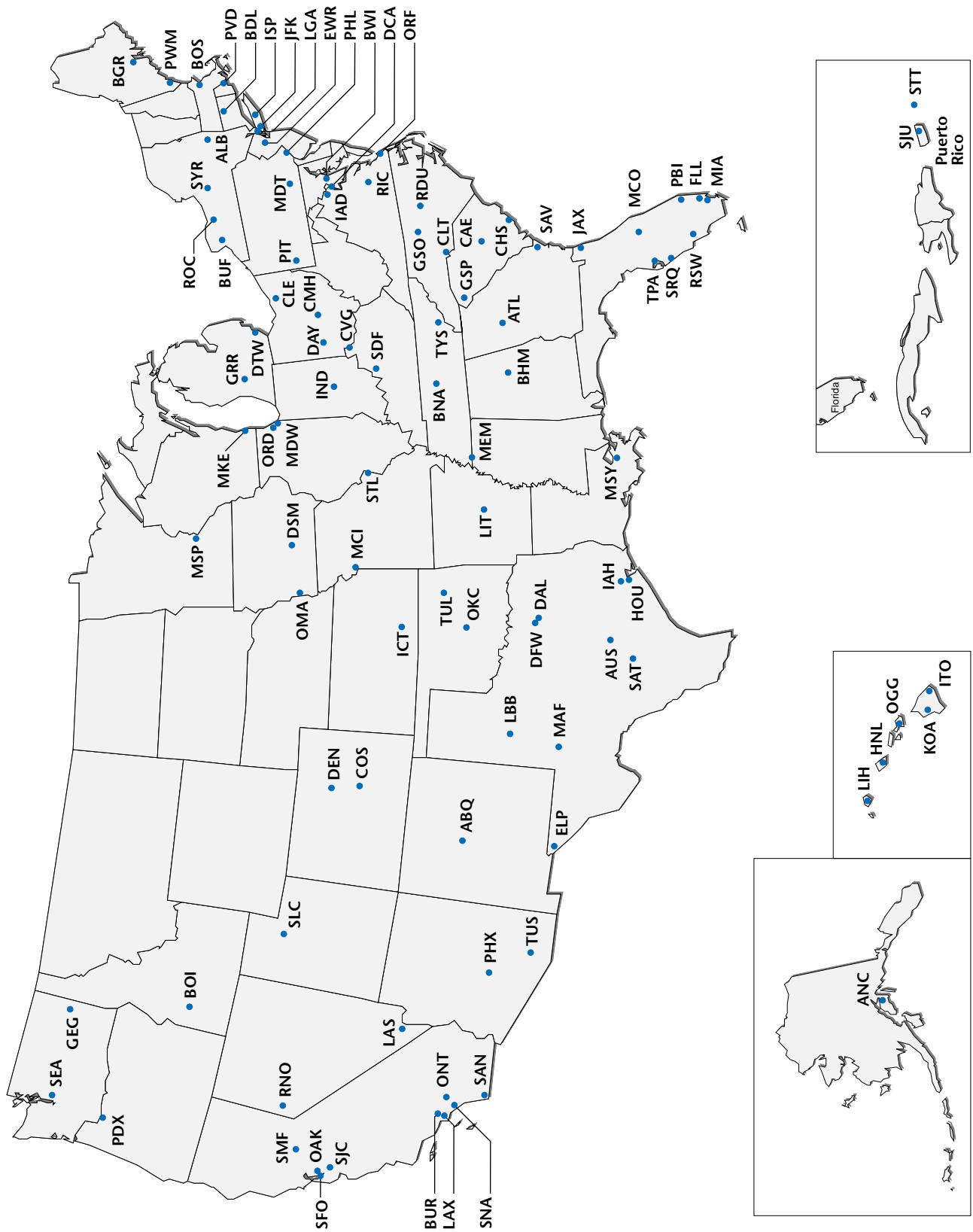


Figure 1-2. Top 100 Airports Based on 1994 Passenger Enplanements

1.3.2 Traffic Volumes in Air Route Traffic Control Centers (ARTCCS)

Air traffic volume statistics for FY94 show that instrument flight rules (IFR) operations increased at 17 of the 20 Continental United States (CONUS) ARTCCS over FY93. In FY94, the number of aircraft flying under IFR handled by ARTCCs totaled 38.8 million, an increase of 3.7 percent over 1993 activity counts.⁷ The increase at en route centers in the last 10 years (up 18.7 percent) can be attributed to the growth in commercial aviation activity (up 36.6 percent). The number of commercial aircraft handled at the centers (26.5 million) increased 5.2 percent in FY94. The number of air carrier aircraft handled totaled 20.0 million, while the number of commuter/air taxi aircraft handled totaled 6.5 million (up 5.4 percent). General aviation and military activity rose 0.8 percent for the year.

Aircraft operations at the centers are expected to grow at an average rate of 1.9 percent a year between 1994 and 2006.⁸ In absolute numbers, center operations are forecast to increase from 38.8 million aircraft handled in 1994 to 48.9 million in 2006. In 1994, 51.5 percent of the traffic handled at centers were air carrier flights. This proportion is expected to increase only slightly to 53.9 percent in 2006.

Figure 1-3 provides a map of the 20 CONUS ARTCCs. Figure 1-4 compares the number of operations during FY93 and FY94 and provides a forecast for FY06 for each of the 20 CONUS ARTCCS. A breakdown by user group of the traffic handled by the centers in 1993 and 1994, operations data for the individual ARTCCS for 1993 and 1994, and forecasts for 2006 are included in Appendix A.

7. Based on FAA's Forecasts of IFR Aircraft Handled by Air Route Traffic Control Centers Fiscal Years 1995 - 2006, FAA-APO-95-6, May 1995

8. Based on *FAA Aviation Forecasts, Fiscal Years 1995-2006*, FAA-APO-95-1, March 1995

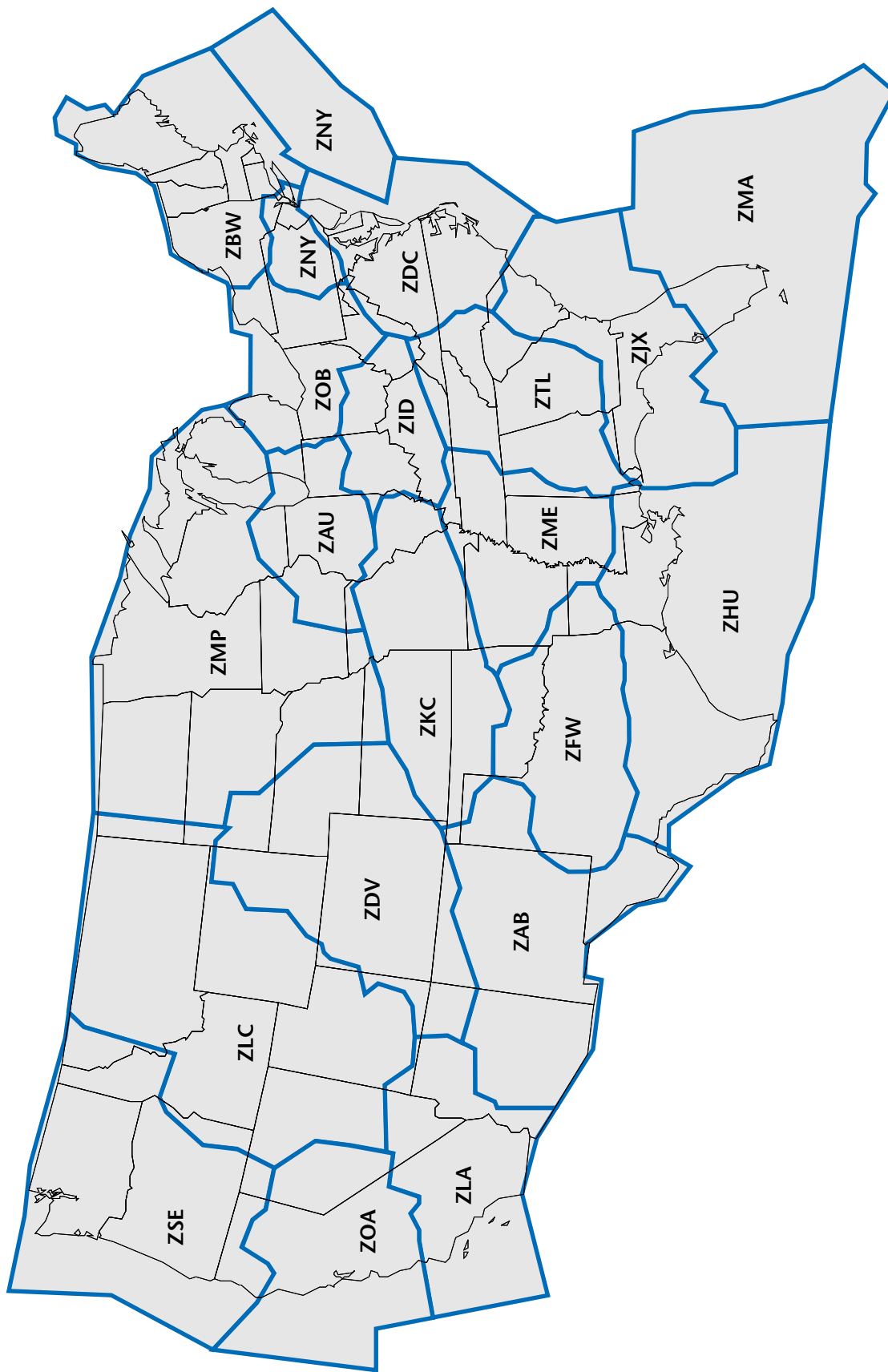


Figure 1-3. Continental Air Route Traffic Control Centers

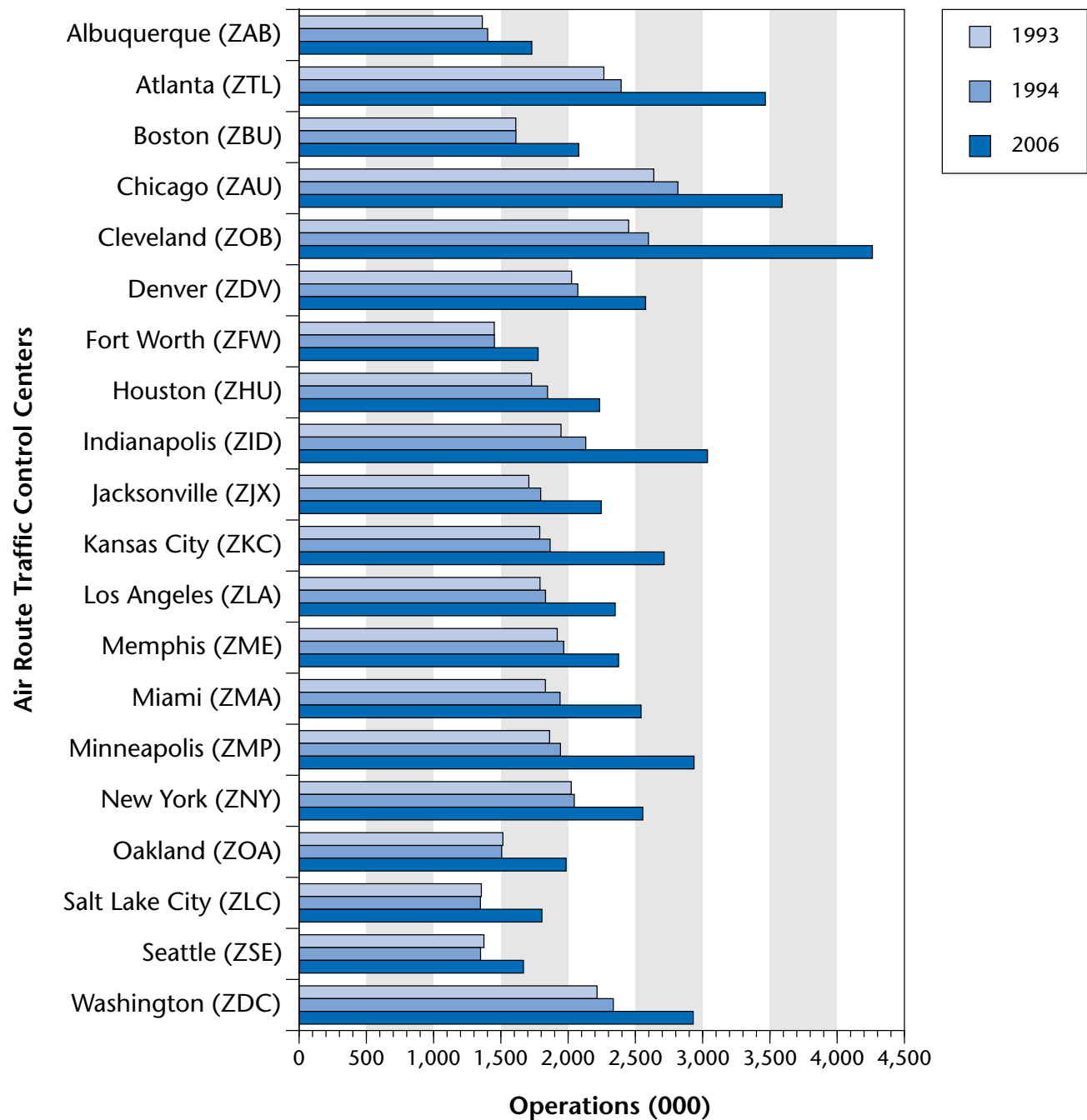
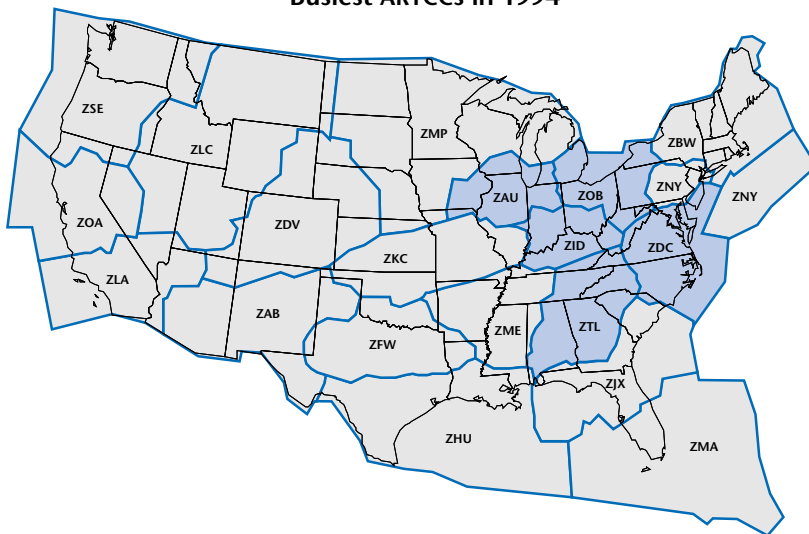


Figure 1-4. Operations at ARTCCs

The busiest ARTCCs in 1994 were: Chicago, Cleveland, Atlanta, Washington, and Indianapolis. Forecasts for 2006 indicate a change in ranking of the busiest ARTCCs to: Cleveland, Chicago, Atlanta, Indianapolis, and Minneapolis. The centers with the highest average annual growth rates are Oakland and Jacksonville, which are projected to grow by 3.9 and 2.8 percent respectively. The relatively high growth at these two centers reflects the projected high growth of domestic traffic demand in the West and South. Oakland Center is forecast to experience the largest absolute growth, from 1.6 million aircraft operations in 1992 to 2.7 million in the year 2005, a 64 percent increase. This reflects the continuing development and strong projected growth on trans-Pacific routes.

Busiest ARTCCs in 1994



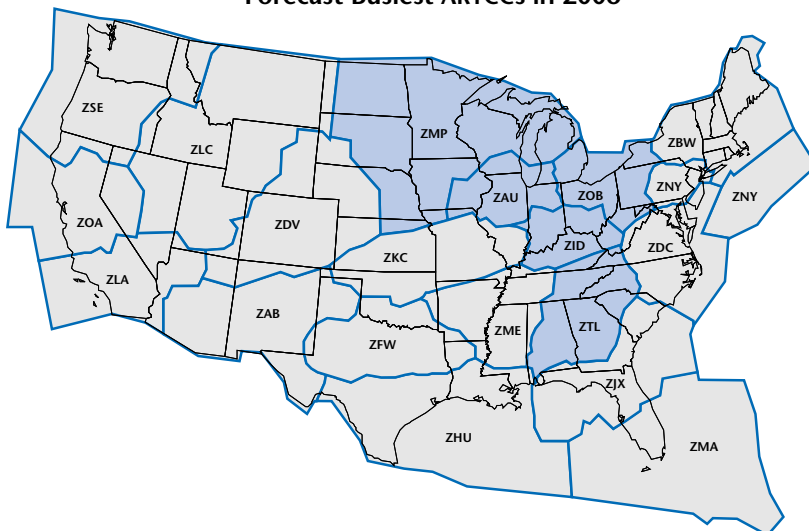
The busiest ARTCCs in 1994 were:

Chicago
Cleveland
Atlanta
Washington
Indianapolis

Forecasts for 2006 indicate a change in ranking of the busiest ARTCCs to:

Cleveland
Chicago
Atlanta
Indianapolis
Minneapolis

Forecast Busiest ARTCCs in 2006



1.4 Delay⁹

1.4.1 Sources of Delay Data

Delay can be thought of as another system performance parameter, an indicator that capacity is perhaps being reached and even exceeded. Currently, the FAA gathers delay data from two different sources. The first is through the Air Traffic Operations Management System (ATOMS), in which FAA personnel record aircraft that are delayed 15 or more minutes by specific cause (weather, terminal volume, center volume, closed runways or taxiways, and NAS equipment interruptions). Aircraft that are delayed by less than 15 minutes are not recorded in ATOMS.

The second source of delay data is through the Airline Service Quality Performance (ASQP) data, which is collected, in general, from airlines with one percent or more of the total domestic scheduled service passenger revenue and represents delay by phase of flight (i.e., gate-hold, taxi-out, airborne, or taxi-in delays). Actual departure time, flight duration, and arrival times are reported along with the differences between these and the equivalent data published in the *Official Airline Guide* (OAG) and entered in the Computer Reservation System (CRS). ASQP delays range from 0 minutes to greater than 15 minutes. In the discussion that follows, “delay by cause” refers to ATOMS data, and “delay by phase of flight” refers to ASQP data.

The delay data reported through ATOMS and ASQP are not without their problems. ATOMS is the official FAA delay reporting system. However, it only reports delays of 15 minutes or more; it aggregates flight delays, thus making it impossible to determine if a particular flight was delayed; and it only reports flight delays due to an air traffic problem (i.e., weather, terminal volume, center volume, closed runways or taxiways, and NAS equipment interruptions). ASQP only reports on carriers with at least 1 percent of domestic passenger enplanements for scheduled air carrier flights. ASQP is used primarily for consumer on-time performance reporting and is under DOT control.

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9. Although no existing delay reporting system is fully comprehensive, this Plan aims to identify problem areas through available data, such as the following delay information and the previously mentioned aviation activity statistics.

The FAA is developing an improved aircraft delay data system to provide a single, integrated source of data to answer analytical questions about delay at a detailed level. This new system, the Consolidated Operations and Delay Analysis System (CODAS), will use Enhanced Traffic Management System (ETMS), OAG, ASQP, and Aeronautical Radio Incorporated (ARINC) Communications Addressing and Reporting System (ACARS) data to calculate delay by phase of flight and will include weather data from the National Oceanic and Atmospheric Administration (NOAA) for analysis purposes. By combining, comparing, and screening the data from these sources, a refined data source is created, which can be used for accurate delay calculations and model validation. CODAS will not replace ATOMS, which will continue to be the official FAA delay reporting system.

1.4.2 Delay by Cause

Flight delays exceeding 15 or more minutes, as recorded by OPSNET, were experienced on approximately 248,000 flights in 1994, a decrease of 10 percent over 1993. Weather was attributed as the primary cause of 75 percent of operations delayed by 15 minutes or more in 1994, up from 72 percent in 1993. Terminal air traffic volume accounted for 19 percent of delays of 15 or more minutes, down from 22 percent in 1993. Table 1-1 details these and other factors that caused delays of 15 minutes or more and provides a history of this breakdown of delay by primary cause. With the exception of the split between terminal and center volume delays, the basic distribution of delay by cause has remained fairly consistent over the past seven years.

More than half of all delays are attributed to adverse weather. These delays are largely the result of instrument approach procedures that are much more restrictive than the visual procedures in effect during better weather conditions. The FAA continues to install new and upgrade existing instrument landing systems (ILSs) to support continued operations during conditions of reduced visibility. During the past few years, the FAA has developed new, capacity-producing approach procedures that take advantage of improving technology while maintaining the current level of safety. These new procedures, and a corresponding estimate of the expected increase in the number of operations per hour, are discussed in Chapter 3.

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1.4.3 Delay by Phase of Flight

Based on ASQP data, Table 1-2 presents the average delay in minutes by phase of flight. This table shows, for example, that more delays occur during the taxi-out phase than any other phase and that airborne delays average 4.1 minutes per aircraft. To put this in perspective, there were approximately 6,200,000 air carrier flights in 1992.¹⁰ With an average airborne delay of 4.1 minutes per aircraft, this means that there was a total of over 424,000 hours of airborne delay that year, which, at an estimated \$1,600 per hour, cost the airlines \$678 million.

Table 1-1. Distribution of Delay Greater Than 15 Minutes by Cause

Distribution of Delay Greater than 15 Minutes by Cause								
Cause	1987	1988	1989	1990	1991	1992	1993	1994
Weather	67%	70%	57%	56%	65%	65%	72%	75%
Terminal Volume	11%	9%	29%	35%	27%	27%	22%	19%
Center Volume	13%	12%	8%	2%	0%	0%	0%	0%
Closed Runways/Taxiways	4%	5%	3%	3%	3%	3%	3%	2%
NAS Equipment	4%	3%	2%	1%	2%	2%	2%	2%
Other	1%	1%	1%	4%	3%	3%	3%	2%
Total Operations Delayed (000s)	356	338	394	393	298	281	276	248
Percent Change from Previous Year	-15%	-5%	+17%	0%	-24%	-6%	-2%	-10%

10. *FAA Aviation Forecasts, Fiscal Years 1994-2005*, FAA-APO-94-1, March 1994

Table 1-2. Average Delay by Phase of Flight¹¹

Average Delay by Phase of Flight (minutes per flight)						
Phase	1989	1990	1991	1992	1993	1994
Gate-hold	1.0	1.0	1.1	1.1	1.0	1.1
Taxi-out	7.0	7.2	6.9	6.9	6.9	6.8
Airborne	4.3	4.3	4.1	4.1	4.1	4.1
Taxi-in	2.2	2.3	2.2	2.2	2.2	2.2
Total	14.5	14.8	14.3	14.3	14.2	14.2
Mins./Op.	7.3	7.5	7.1	7.1	7.1	7.1

1.4.4 Identification of Delay-Problem Airports

For CY94, compared to 1993, the number of airline flight delays of 15 minutes or more decreased at 29 of the 55 airports at which the FAA collects air traffic delay statistics. Table 1-3 lists the number of operations delayed 15 minutes or more per 1,000 operations from 1990 to 1994 at 51 of these airports. These delays ranged from nearly 75 per 1,000 operations at Newark International Airport to 0.21 per 1,000 at Albuquerque International Airport. Three of the top six airports in delays of 15 or more minutes were in the New York area.

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11. **Gate-hold Delay:** The difference between the time that departure of an aircraft is authorized by ATC and the time that the aircraft would have left the gate area in the absence of an ATC gatehold.

Taxi-Out Delay: The difference between the time of lift-off and the time that the aircraft departed the gate, minus a standard taxi-out time established for a particular type of aircraft and airline at a specific airport.

Airborne Delay: The difference between the time of lift-off from the origin airport and touchdown, minus the computer-generated optimum profile flight time for a particular flight, based on atmospheric conditions, aircraft loading, etc.

Taxi-in Delay: The difference between touchdown time and gate arrival time, minus a standard taxi-in time for a particular type of aircraft and airline at a specific airport.

Mins/op: Average delay in minutes per operation.

Table 1-3. Delays of 15 Minutes or More Per 1,000 Operations at the Top 100 Airports

Airport	ID	1990	1991	1992	1993	1994
Newark International Airport	EWR	84.94	67.26	83.48	87.88	74.29
New York LaGuardia Airport	LGA	86.79	61.63	55.23	38.32	47.37
Dallas-Fort Worth International Airport	DFW	32.02	35.32	29.82	33.71	37.65
New York John F. Kennedy International Airport	JFK	68.33	41.67	41.23	35.68	35.79
Boston Logan International Airport	BOS	32.26	32.84	34.61	39.23	29.79
San Francisco International Airport	SFO	45.79	58.13	30.18	23.79	28.46
Chicago O'Hare International Airport	ORD	64.61	47.94	45.40	47.49	26.83
Lambert St. Louis International Airport	STL	25.24	29.90	14.96	19.54	22.72
Philadelphia International Airport	PHL	35.44	16.87	18.47	18.75	20.85
Hartsfield Atlanta International Airport	ATL	44.08	22.09	29.90	23.28	19.98
Denver Stapleton International Airport	DEN	28.94	28.44	26.26	37.92	18.14
Los Angeles International Airport	LAX	7.11	14.80	19.75	9.15	10.96
Miami International Airport	MIA	8.55	23.96	9.68	10.48	10.47
Washington National Airport	DCA	9.57	5.61	11.03	9.34	10.44
Washington Dulles International Airport	IAD	7.36	9.01	7.33	6.86	8.43
Detroit Metropolitan Wayne County Airport	DTW	19.92	9.26	11.24	9.05	6.95
Greater Cincinnati International Airport	CVG	11.23	5.28	5.95	6.38	6.40
Seattle-Tacoma International Airport	SEA	30.55	18.85	13.19	6.78	6.09
Houston Intercontinental Airport	IAH	12.72	12.62	7.86	8.06	5.52
Orlando International Airport	MCO	7.32	6.42	8.95	4.72	5.37
Baltimore-Washington International Airport	BWI	17.59	5.99	5.80	3.94	5.15
Charlotte/Douglas International Airport	CLT	12.61	9.68	6.19	3.79	4.90
Greater Pittsburgh International Airport	PIT	8.55	5.04	8.04	6.86	4.20
Minneapolis-St. Paul International Airport	MSP	31.93	7.87	4.36	7.16	3.52
Phoenix Sky Harbor International Airport	PHX	9.91	6.68	8.16	2.86	3.48
Tampa International Airport	TPA	4.81	2.88	4.29	3.88	3.22
Chicago Midway Airport	MDW	15.81	7.09	2.12	2.98	3.10
Houston William P. Hobby Airport	HOU	4.57	5.04	2.74	3.49	2.96
Fort Lauderdale-Hollywood International Airport	FLL	3.05	2.09	3.69	3.77	2.92
Salt Lake City International Airport	SLC	3.16	3.73	5.07	3.86	2.79
San Diego International Lindbergh Field	SAN	6.40	10.16	3.03	3.91	2.51
Portland International Airport	PDX	1.34	1.42	1.78	1.94	2.41
Kansas City International Airport	MCI	2.31	2.98	0.75	1.26	1.82
Cleveland Hopkins International Airport	CLE	4.69	1.99	1.58	2.37	1.62
Nashville International Airport	BNA	1.71	3.90	2.91	2.72	1.55
Raleigh-Durham International Airport	RDU	2.38	2.00	3.60	1.99	1.25
Bradley International Airport	BDL	3.76	2.36	1.96	0.95	1.15
Ontario International Airport	ONT	1.20	1.62	1.33	1.24	0.96
Memphis International Airport	MEM	2.99	2.43	1.10	1.03	0.79
Las Vegas McCarran International Airport	LAS	1.21	0.42	0.31	0.46	0.78
Dayton International Airport	DAY	1.48	1.05	0.29	0.29	0.76
San Jose International Airport	SJC	11.13	4.29	1.74	0.38	0.72
San Juan Luis Muñoz Marín International Airport	SJU	0.36	0.14	0.56	0.30	0.71
Indianapolis International Airport	IND	0.78	1.02	2.11	0.57	0.45
Palm Beach International Airport	PBI	1.40	1.50	1.02	0.81	0.39
San Antonio International Airport	SAT	0.76	0.32	0.20	0.10	0.35
Anchorage International Airport	ANC	1.96	1.32	0.34	0.74	0.29
New Orleans International Airport	MSY	1.96	1.09	0.62	0.33	0.21
Albuquerque International Airport	ABQ	1.05	0.68	0.69	0.27	0.21
Honolulu International Airport	HNL	0.41	0.38	0.13	0.19	0.08
Kahului Airport	OGG	0.15	0.13	0.13	0.05	0.03

1.4.5 Identification of Forecast Delay-Problem Airports

Forecasts indicate that, without capacity improvements, delays in the system will continue to grow. In 1994, 23 airports each exceeded 20,000 hours of annual aircraft flight delays. Assuming no improvements in airport capacity are made, 29 airports are forecast to each exceed 20,000 hours of annual aircraft flight delays by the year 2004. Table 1-4 lists the airports with 1994 actual and 2004 forecast air carrier delay hours in excess of 20,000 hours. The current forecast for 29 delay-problem airports in 2004 is eleven less than the 40 airports predicted in the forecast of three years ago. This reflects the overall decline in air travel as a result of the recession, and an economic recovery that has been slower than expected.

Figure 1-5 shows the airports exceeding 20,000 hours of annual aircraft delay in 1994 and the airports forecast to exceed 20,000 hours of annual aircraft delay in 2004, assuming there are no capacity improvements.

1.5 The FAA Strategic Plan and the NAS Architecture — A Vision for the Year 2010

A vigorous aviation system is essential for United States economic prosperity, and the entire aviation community must work together in order to maintain what has become the safest, most efficient, and most responsive aviation system in the world. To support this effort, the FAA developed the FAA Strategic Plan and the NAS Architecture. The two documents are a foundation for an iterative process to develop, in cooperation with all the users of the national aviation system, a common vision of the future from which to set policies, strategies, and operational goals for the year 2010.

In the year 2010, more people will be flying, more often, to more places than ever before. U.S. domestic passenger enplanements will double, and commuter and regional enplanements will triple. U.S. airlines will carry more than one billion passengers annually. Operations by general aviation aircraft will increase by 44 percent to 43 million flight hours annually. World revenue passenger miles will increase by 200 percent to reach 3.2 trillion. Larger aircraft sizes and higher load factors will combine to prevent even larger increases. Global air cargo revenue ton miles will grow by 136 percent reaching 130 billion. Helicopters and new tiltrotor and tiltwing

Table 1-4. 1994 Actual and 2004 Forecast Air Carrier Delay Hours

Annual Aircraft Delay in Excess of 20,000 Hours					
1994		2004			
Atlanta Hartsfield	ATL	Atlanta Hartsfield	ATL	New York La Guardia	LGA
Boston Logan	BOS	Boston Logan	BOS	Orlando	MCO
Charlotte/Douglas	CLT	Baltimore-Washington	BWI	Chicago Midway	MDW
Washington National	DCA	Charlotte/Douglas	CLT	Memphis	MEM
Denver Stapleton	DEN	Cincinnati	CVG	Miami	MIA
Dallas-Ft. Worth	DFW	Washington National	DCA	Minneapolis-Saint Paul	MSP
Detroit	DTW	Dallas-Ft. Worth	DFW	Chicago O'Hare	ORD
Newark	EWR	Detroit	DTW	Philadelphia	PHL
Honolulu	HNL	Newark	EWR	Phoenix	PHX
Houston Intercont'l	IAH	Honolulu	HNL	Pittsburgh	PIT
New York John F. Kennedy	JFK	Houston Intercont'l	IAH	San Diego	SAN
Los Angeles	LAX	New York John F. Kennedy	JFK	Seattle-Tacoma	SEA
New York La Guardia	LGA	Las Vegas	LAS	San Francisco	SFO
Orlando	MCO	Los Angeles	LAX	Salt Lake City	SLC
Miami	MIA			St. Louis	STL
Minneapolis-Saint Paul	MSP				
Chicago O'Hare	ORD				
Philadelphia	PHL				
Phoenix	PHX				
Pittsburgh	PIT				
Seattle-Tacoma	SEA				
San Francisco	SFO				
St. Louis	STL				

aircraft will play an increasingly important role in providing short-haul and medium-range passenger service. The market for new aircraft over the next 20 years will be almost one trillion dollars, more than double the market over the past 20 years. The challenge for the year 2010 will be to ensure that flights are conducted with unprecedented levels of safety, security, and efficiency, while conserving natural resources and minimizing the effects on the environment.

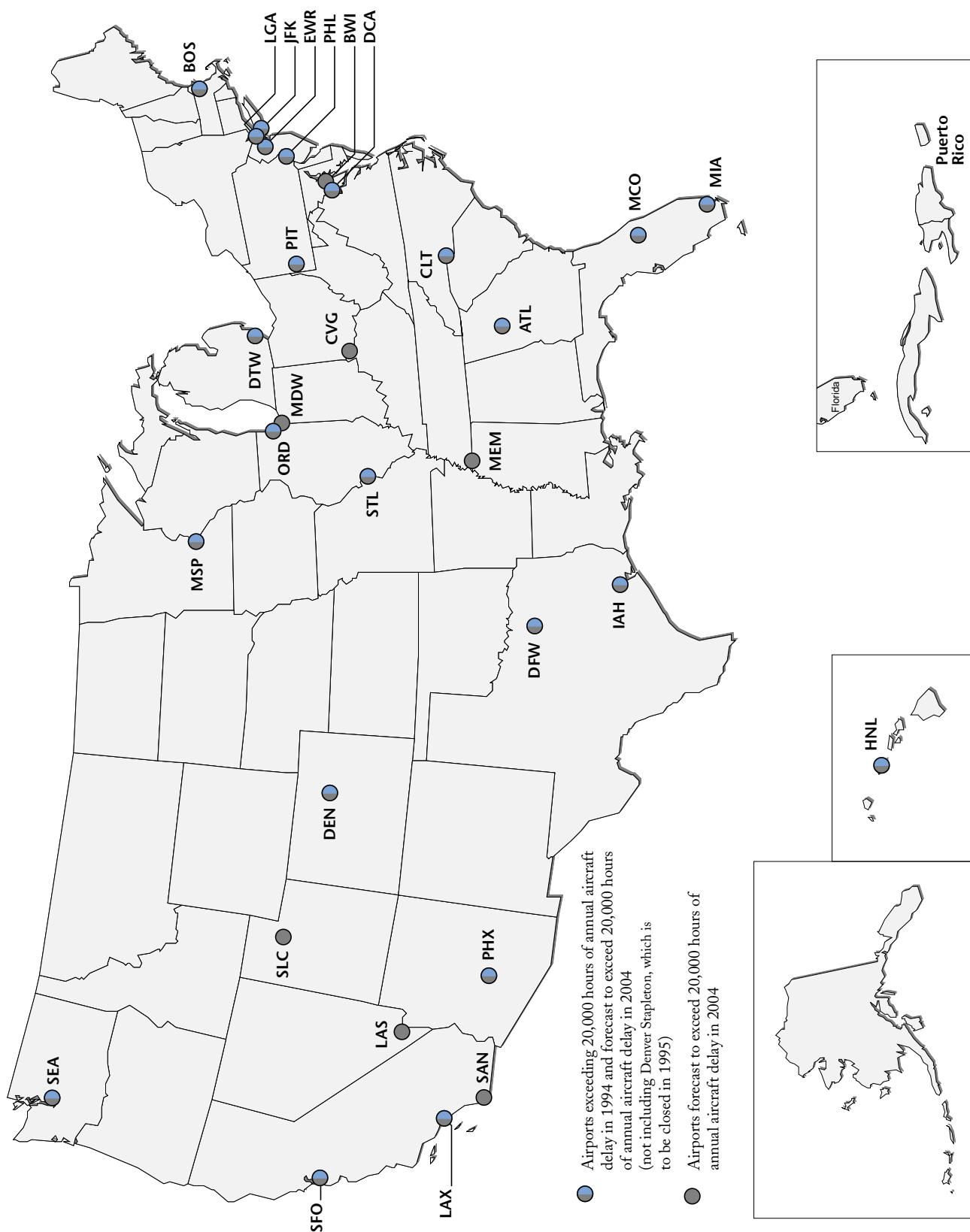


Figure 1-5. Airports Exceeding 20,000 Hours of Annual Delay in 1994 and 2004, Assuming No Capacity Improvements

Source: FAA Office of Policy and Plans

1.5.1 System Capacity Goals and Objectives

The FAA Strategic Plan identifies System Capacity as one of seven strategic issue areas. The principal goals for the aviation system capacity program in Volume II of the FAA Strategic Plan are to ensure that:

- Airspace, airport, and airside capacity continue to grow to meet user needs cost effectively.
- Capacity resources are fully utilized to meet traffic demand and eliminate capacity-related delays.
- Airport capacities in instrument meteorological conditions (IMC) equal capacities in visual meteorological conditions (VMC).

Specific objectives have been developed in the FAA Strategic Plan to support the general goal of the system capacity program to build aviation system capacity that will minimize delays and allow fair access for all types of aviation. The FAA Operational Concept, in turn, lays out specific milestones the FAA will complete over the next five years to achieve these objectives.

- System Capacity Measurement — to identify and define, in concert with the aviation community, standards of success and national capacity indicators that will better target areas for reducing delay and increasing capacity.
- Near-Term Capacity Initiatives — to reduce constraints/limitations at the top 40 delay/operationally impacted airports by timely implementation of system enhancements and capacity increasing technologies and procedures.
- ATC Automation — to improve the automated infrastructure through replacement and enhancements in order to provide the platform for capacity-enhancing technologies and procedures.
- Traffic Flow Management — to create the necessary capabilities that will permit the ATC system to ensure safe separation while imposing minimum constraints on system users and aircraft movement.

- Oceanic Control — to change, in concert with the international aviation community, oceanic air traffic control from its current non-radar control to a tactical control environment much like current domestic radar control.
- Weather Forecasting, Detection, and Communication — to reduce the capacity-impacting consequences of weather phenomena by improved weather forecasts and increased accuracy, resolution, and dissemination of observations both on the ground and in the air.
- Communications, Navigation, and Surveillance (CNS) and Satellite Navigation — to implement CNS and satellite navigation capabilities through an aggressive industry/government partnership that achieves user benefits in all phases of aviation operations.
- Communications/Data Link — to provide a cost-effective communications infrastructure to enhance the safety and effectiveness of air traffic management operations.
- Airport Planning — to improve the national airport planning process by adding a method for prioritizing projects; by linking the national plan to the grant program through an Airport Capital Improvement Program; and by developing the Airport Research, Engineering, and Development (RE&D) program.
- Human Factors — to implement new automation technologies and associated functional improvements in a manner that fully accounts for the proper role of the human in the system.
- Free Flight — accept and implement the 46 recommendations from RTCA Task Force 3 on Free Flight Implementation, in collaboration with the users.